TOPEX Software Development Team
Observational Science Branch
Laboratory for Hydrospheric Processes
NASA GSFC/WFF
Wallops Island, VA 23337

Memorandum

To: TIAS Users
From: CSC/Jeff Lee
Date: 11 January 1996
Subject: TIAS Release Notes

This is the roll-out memo for the Build 3 Release of TIAS. This details the revision history of TIAS - the TOPEX Interactive Analysis System. This memo will be revised and distributed subsequent to a new TIAS release.

The current version of the TIAS software is available on osb3 in /gen/topex2/tias. It may be run by changing to the /gen/topex2/tias directory and typing './tias'. This area will be frequently updated with mini-releases. TIAS is currently up to 8,172 lines of code.

01/11/96 : Build 3 RELEASE

- Added support for GEOSAT GDRs.
- Reworked all file import/output routines. Directory defaults are now "smarter" in that they start out in an appropriate directory and remember the last directory used for the type of operation performed.
- Reworked loading datasets. User is now presented with a pull-down menu to select different filetypes. If user does not select a filetype when opening, he is asked what type of file he has selected. This feature depends upon standard filenaming conventions.
- Reworked tias directory structure. Created seperate directories for programs, window settings, user programs, and data. Reworked pathing code to compensate.
- Added ability to export selected fields of a dataset to a tab-delimited file. Filtering is effective during this operation. There is, however, an internal IDL limitation to the number of characters that can be written to the output file. TIAS will crash if asked to write too many fields.
- Added filter and label settings to saved window settings files. Can still read old formats, but warns the user to re-save the file in order to take advantage of new format.
- Fixed a problem caused when attempting to print multiple windows but specifying no plot-per-page parameters.
- Added ability to read TOPEX AIF database engineering file.
- Added ability to read TOPEXAIF database calibration file.
- Added ability to read TOPEX AIF database waveform difference files.
- Added ability to read TOPEX Sensor Data Record files.
- Added ability to read TOPEX GDR science database files.
- Added ability to read TOPEX GDR summary database files.

09/06/95 : Build 2 RELEASE

- Reworked all the code to handle plot legend off/on switch and include the legend on printout.
- Added support for MGDRs.
- Added multi-window-per-page print option. Also reduced size of text on printout.
- Added user-defined filtering.
- Added dataset processing & example subroutines.

08/04/95 : Build 1 RELEASE

- Plot title now defaults to selected dataset (per DH suggestion).
- Fixed some bugs when window is switched back and forth between Normal, Map & Mode plots.
- Tape Manager has been implemented. Allows user to load I/GDRs and/or GDRs from tape. Tape database is complete and up-to-date. There is not much IDL can do in the way of tape error detection. NOTE - It takes a LONG time to load a file from tape!
- Fixed bug which prevented formatting changes to Y2 & Y4 from taking effect.
- Plotting code now allows combinations of lines & symbols. Previously, specification of a plot symbol turned lines off.
- Implemented STANDARD data filtering. Added filter setting to subtitle of plot.
- Fixed obscure bug caused by an overflow condition when decoding time.

07/24/95 : Build 0.3 BETA

- Window settings can be saved & loaded. We can easily build a library of setting files that will automate most of the plot formatting drudgery. We need our user base to tell us how these “standard” plots should look.
- Plots may be exported in the following formats: GIF, JPEG, TIFF, Windows Bitmap, Macintosh PICT, and Sun Raster. Still working on EPS.
- Added Normal Plot, Map Plot, and Mode Plot options to the Plot Window menu. Map Plot changes the current plot window to a map plot window, where latitude, longitude, and a coded landwater symbol are plotted on a map. The user may overplot another variable on the right Y axis. Mode Plot changes the current plot window into a mode plot window. The user may overplot another variable on the right Y axis. Normal Plot returns the window to a normal plot window.
- Removed string variables (UTCASCII, MODE, AGCTYPE, KUON, CON, ALTOPER, etc) from variables list. Replaced with numeric equivalents.
- Added new color choices in the AxisMgr and fixed old color choices.
- Started rudimentary documentation.

07/19/95 : Build 0.2 BETA

- Renamed and rearranged some menu names so that functions might be a little clearer.
- Dataset Manager implemented. Allows user to select which loaded dataset to use with the current window. This also allows “hot swapping” of datasets within a plot window as long as the datasets are of the same type (not a problem now because we only support one datatype : GDRs).
- Single window printing is now supported.

07/18/95 : Build 0.1 BETA

- Reads binary I/GDR files using widget list to select filename.
- Support multiple datasets loaded at same time.
- Supports multiple Plot windows (Last dataset loaded in window is selected for that window.)
- Supports plots that resize when window is resized.
- Allows plot variables to be chosen from widget list.
- Allows up to 4 Y-parameters per plot (Y1 & Y2 on left axis, Y3 & Y4 on right axis).
- Allows custom plot title.
- Allows custom Axis settings. Parameters include : label, gridstyle, and automatic/manual scaling.
- Allows custom Variable settings. Parameters include : linestyle, line thickness, color, and symbol.

KNOWN PROBLEMS

- Things may act strange when switching a customized window from one DataType (eg: IGDR) to another (eg: MGDR). This will be fixed in a later release by reinitializing the current window whenever datatypes are switched.

Re-Revised Build Schedule

Build 1 - August 01, 1995 (COMPLETED)

- File selection widget (1)
- Software shall read and EU convert binary I/GDRs (1)
- Work with full-rate data (1)
- X Window display (1)
- One plot per window (1)
- Selectable Y parameters (Up to 4 - 2 per right axis, 2 per left axis) (1)
- Selectable X parameters (1)
- Axis - auto or fixed scaling for X and Y axes (1)
- Selectable color, linestyle, symbol, & thickness (1)
- Selectable gridlines (1)
- Selectable labels/titles (1)
- Multiple datasets of same or different types open at once. Only limited by memory. (2)
- Postscript printouts (2)
- Multiple windows per display (2)
- GIF Files (3)
- Ability to save & load settings for a window (4)
- Ability to save & load settings for a display (4)
- Standard data filtering (NEW)
- Tape Manager (NEW)
- Map Plot
- Mode Plot (NEW)

Build 2 - September 01, 1995 (COMPLETED)

- Plot legend added to printout.
- Multi-window printout.
- Support MGDRs.
- User-specified data filtering.
- API for calling user-written subroutines.

Build 3 - December 01, 1995 (COMPLETED)

- Software shall read database output files (4)
- Output tab-Delimited Data Files (4)
- Software shall read and EU convert Binary SDRs (3)
- Support GEOSAT GDRs
- Filter settings shall be saved with window settings.

Build 4 -?

- Data selection by “clicking” on plot (4).
- Auto window placement (tile, stack).

TOPEX Interactive Analysis System (TIAS)
Interm Documentation

TIAS Main Menu

The TIAS Main Menu is the central control screen for TIAS.

New Plot Window

This button creates a new plot window. The number of plot windows created is only limited by IDL memory and/or resources.

Load Settings

This button creates new windows and reads multiple of window settings from a saved file.

Save Settings

This button saves the number and settings of current windows into a file.

Tile Windows

Not yet implemented.

Stack Windows

Not yet implemented.

Print Windows

Not yet implemented.

Quit

Quits TIAS and exits IDL.

Plot Window

The TIAS Plot Window contains a data plotting area, labels, and menus used to control what data is plotted and how that data is displayed. The number of plot windows is only limited by IDL memory and resources. Each plot window must have one dataset associated with it. Datasets, however, may be changed quickly and easily within the window.

File Menu : Load a New Dataset

This menu option loads a new dataset from a data file into memory. The number of datasets loaded is only limited by IDL memory and resources. Multiple windows may be associated with one dataset, but only one dataset may be associated with one window. When a dataset is loaded, it is automatically associated with the window from which the user loaded it if there is no dataset currently selected for that window.

File Menu : Tape Manager

This menu option loads a new dataset from a data tape, onto disk, and into memory. The process of

loading from tape takes a LONG time. When a dataset is loaded, it is automatically associated with the current window it if there is no dataset currently selected for that window.

File Menu : Load Window Settings

This menu option loads variable selection and plot formatting information for the current plot window from a previously saved window settings file. Window settings files should end with a '.wset' extension and saved in the **wset** directory.

File Menu : Save Window Settings

This menu options saves variable selection and plot formatting information for the current plot window from to a window settings file so that the current plot may be quickly and easily created at a later time. Window settings files should end with a '.wset' extension and saved in the **wset** directory.

File Menu : Export Data

This menu option exports selected dataset parameters into a tab-delimited text file. If a filter is set, it will be applied to the dataset before exporting.

File Menu : Export Plot As...

This menu option exports the current plot window in one of the following graphic file formats : GIF, JPEG, TIFF, PostScript, Window Bitmap, Macintosh PICT, or Sun Raster.

File Menu : Print this Window

This menu option prints the current plot window to the selected printer at full printer resolution. For this reason, the printed plot may look slightly different than the plot displayed. The user has options to choose what printer is used and how the plot is oriented.

File Menu : Quit this Window

This menu option closes the current window and frees up the memory used by it. The current dataset is not deleted.

Dataset Management : Select a Loaded Dataset

This menu option allow the user to associate a loaded dataset with the current window. Only one dataset may be associated with the current window.

Dataset Management : Remove a Loaded Dataset

Not yet implemented.

Dataset Management : Subset a Loaded Dataset : Apply Standard Filter

Applies appropriate standard filter to current dataset.

Dataset Management : Subset a Loaded Dataset : Apply Custom Filter

Allows the user to create a filter with up to five custom conditions.

Dataset Management : Subset a Loaded Dataset : Clear Current Filter

Clears any current filter.

Dataset Management : Process a Loaded Dataset

Allows the user to select a previously-coded user subroutine that will process the current dataset and

return a new dataset. See the attached sample code for an example of how to write a user-written subroutine. These programs should be saved with a "_user.pro" file extension in the **upro** directory.

Plot Window : Select Variables to Plot

This menu option allows the user to choose one X and up to four Y variables for display in the current window. One X variable and at least one Y variable must be selected in order for a plot to be displayed. Y1 & Y2 are plotted on the left axis. Y3 & Y4 are plotted on the right axis. Y1 must be selected before Y2, Y3, and Y4. Y3 must be selected before Y4. To select a variable click on the data parameter on the left side of the window; then, click on one of the buttons on the right side of the window to assign the parameter to an X or Y variable.

Plot Window : Normal Plot

This menu option returns the plot window to a normal plot window. This undoes the Map Plot or Mode Plot settings.

Plot Window : Map Plot

This menu option turns the current plot window into a map plot window. Data latitude & longitude are plotted on an autoscaled map. The landwater flag is encoded into the symbol size & color of the groundtrack. The user may choose to overplot other variables on the right Y axis.

Plot Window : Mode Plot

This menu option turns the current plot window into a mode plot window. The Mode variable is averaged and plotted on a specially coded left axis. The user may choose to overplot other variables on the right Y axis.

Plot Window : Redraw Window

This menu option simply redraws the current window.

Plot Formatting : Plot Title

This menu option allows the user to change the plot title.

Plot Formatting : X Axis

This menu option allows the user to change formatting and scaling for the X axis.

Plot Formatting : Left Y Axis

This menu option allows the user to change formatting and scaling for the left Y axis.

Plot Formatting : Right Y Axis

This menu option allows the user to change formatting and scaling for the right Y axis.

Plot Formatting : Plot Legend : Hide Legend

Disables display of the plot legend.

Plot Formatting : Plot Legend : Show Legend

Enables display of the plot legend.

Sample User-Written Data Processing Subroutine

```
;
; This is a sample user-written program designed to be used as a template for
; other user-written programs.
;
pro KCdiff_user,WPtr
;
; Include Globals
;
  COMMON tias
;
; Setup Local Data Structure
;
  WIDGET_CONTROL,WPtr,GET_UVALUE=W
;
; Make sure there is an active dataset
;
  if (W.DataLoaded le 0) then begin
    i = widget_message('There is no active dataset. Program terminated.',  $
      dialog_parent=WPtr,/Information)
    return
  endif
;
; Put Message onto Screen
;
  i = widget_message(['This program creates a new dataset containing Ku-C ' + $
      'differences.','The new dataset will be created and made the current ' + $
      'dataset for',' this window after you click the OK button.'], $
      dialog_parent=WPtr,/Information)
;
; Get current dataset
;
  Widget_Control, DSPtr(w.dataindex),get_uvalue=DS,/no_copy
  olddataindex = w.dataindex
  if (DS.Type ne 'GDR') then begin
     Widget_Control, DSPtr(w.dataindex),set_uvalue=DS,/no_copy
     i = widget_message('Selected dataset is not a GDR. Program cancelled.',$
       dialog_parent=WPtr,/Error)
     return
  endif
;
; Setup Dataset Information
;
  Hdr=DS.Hdr
  NumRecs=DS.NumRecs
  Type="USER"
  FName=DS.FName+".Ku-C"
;
; Compute differences
;
  EM_Bias_Corr = DS.Data.EM_Bias_Corr_K - DS.Data.EM_Bias_Corr_C
  DRSWHAtt = DS.Data.DRSWHAtt_K - DS.Data.DRSWHAtt_C
  Net_Instr_R_Corr = DS.Data.Net_Instr_R_Corr_K - DS.Data.Net_Instr_R_Corr_C
  Sigma0 = DS.Data.Sigma0_K - DS.Data.Sigma0_C
  AGC = DS.Data.AGC_K - DS.Data.AGC_C
  Net_Instr_AGC_Corr = DS.Data.Net_Instr_AGC_Corr_K-DS.Data.Net_Instr_AGC_Corr_C
```

```
  AGC_RMS = DS.Data.AGC_RMS_K - DS.Data.AGC_RMS_C
  SWH = DS.Data.SWH_K - DS.Data.SWH_C
  SWH_RMS = DS.Data.SWH_RMS_K - DS.Data.SWH_RMS_C
  Gate_Index = DS.Data.Gate_Index_K - DS.Data.Gate_Index_C
;
; Create Data Record
;
  DSRec = { Seconds:DS.Data(0).Seconds, $
            Latitude:DS.Data(0).Latitude, $
            Longitude:DS.Data(0).Longitude, $
            GoodFlag:DS.Data(0).GoodFlag, $
            EM_Bias_Corr:EM_Bias_Corr(0), $
            DRSWHAtt:DRSWHAtt(0), $
            Net_Instr_R_Corr:Net_Instr_R_Corr(0), $
            Sigma0:Sigma0(0), $
            AGC:AGC(0), $
            Net_Instr_AGC_Corr:Net_Instr_AGC_Corr(0), $
            AGC_RMS:AGC_RMS(0), $
            SWH:SWH(0), $
            SWH_RMS:SWH_RMS(0), $
            Gate_Index:Gate_Index(0) }

  Data=replicate(DSRec,NumRecs)
;
; Fill Data structure
;
  Data.Seconds=DS.Data.Seconds
  Data.Latitude=DS.Data.Latitude
  Data.Longitude=DS.Data.Longitude
  Data.GoodFlag=DS.Data.GoodFlag
  Data.EM_Bias_Corr=EM_Bias_Corr
  Data.DRSWHAtt=DRSWHAtt
  Data.Net_Instr_R_Corr= Net_Instr_R_Corr
  Data.Sigma0= Sigma0
  Data.AGC= AGC
  Data.Net_Instr_AGC_Corr=Net_Instr_AGC_Corr
  Data.AGC_RMS=AGC_RMS
  Data.SWH=SWH
  Data.SWH_RMS=SWH_RMS
  Data.Gate_Index=Gate_Index
;
; Create Labels from Structure
;
  Label = tag_names(Data)
;
; Create Structure for New Dataset
;
  newDS={Type:Type,FName:FName,Hdr:Hdr,Label:Label,Data:Data,NumRecs:NumRecs}
;
; Save New DataSet
;
  i=Widget_Base()
  DSRec=DSHdr(0)
  DSRec.Type=newDS.Type
  DSRec.FName=newDS.FName
  DSRec.NumRecs=newDS.NumRecs
  DSPtr=[DSPtr,i]
  DSHdr=[DSHdr,DSRec]
  NumDS=NumDS+1
```

```
  W.DataLoaded = 1
  W.DataIndex = NumDS - 1
  W.FName=newDS.FName
;
; Write Message to Status Bar
;
  Widget_Control,WPtr,Set_UValue=W
  W.message = "Differenced Datasets."
  Widget_Control,WPtr,Set_UValue=W
  updstatus, WPtr
;
; Save Both Datasets
;
   Widget_Control, DSPtr(olddataindex), Set_UValue=DS, /no_copy
   Widget_Control, DSPtr(W.DataIndex), Set_UValue=newDS, /no_copy
;
; End of Subroutine
;
return
end
```